

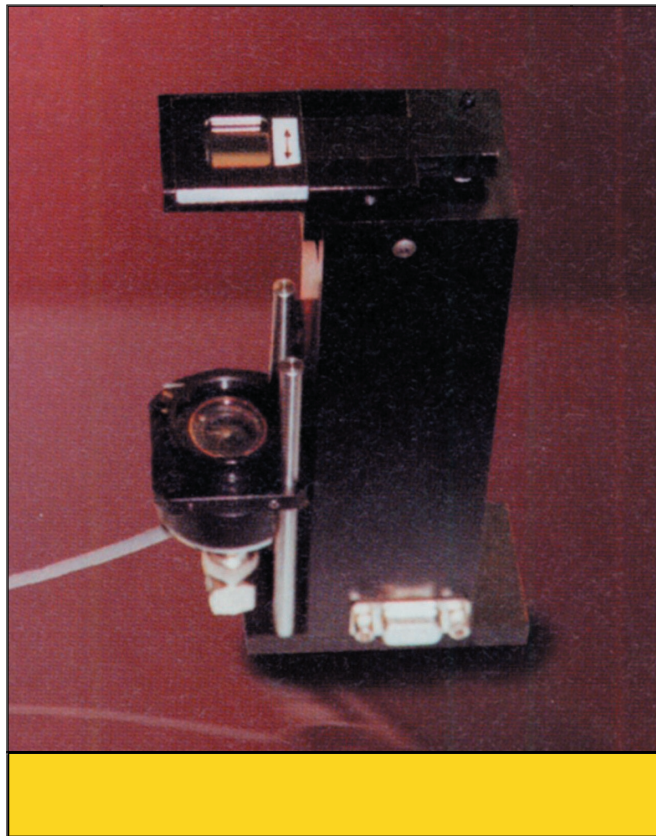


Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Aerospace Forces

Success Story

TECHNOLOGY TRANSFERRED FROM PHOTOSENSITIVE LIQUID CRYSTALS PROJECT RESULTS IN *PHOTONICS* SPECTRA'S CIRCLE OF EXCELLENCE AWARD



Materials whose optical properties change when exposed to light introduce several technology transfer opportunities that could benefit the military, industry, and the medical communities. One such opportunity resulted in this crystal-scan laser beam multimeter, selected as one of the most innovative products of the year. Optical devices, such as liquid crystal optical components, all-optical-beam quality meters, optical laser beam power meter, diffractive optical variables, and handheld nonlinear optical devices, should benefit from this technology.



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Accomplishment

Scientists at the Materials and Manufacturing Directorate, under a Small Business Innovation Research contract with Beam Corporation of Oviedo, Florida, developed a sensitive and highly efficient liquid crystal material that allows the manipulation of laser radiation and the characterization of laser beam shapes. Laurin Publishing's *Photonics Spectra* magazine recognized Beam Corporation's crystal-scan laser beam multimeter, which uses this material, as one of the 25 most technically innovative products of the year.

Background

For the last 10 years, Dr. Thomas Cooper, a researcher with the directorate's Survivability and Sensor Materials Division, made strides towards discovering a material whose optical properties would change upon light adaptation. While working on the Photosensitive Liquid Crystals, Next Generation Materials for Dynamic Holography and Electro Optics project, researchers from the directorate and Beam Corporation researched, identified, and developed a sensitive, highly efficient liquid crystal material that allows the manipulation of laser radiation and the characterization of laser beam shapes.

The directorate transferred the technology to the Beam Corporation for use in the crystal-scan laser beam multimeter, which uses a 50-micrometer layer of nonlinear optical liquid crystal material sandwiched between two pieces of glass. The optical properties of the liquid crystal material make it sensitive to the power density of an incident laser.

When researchers place this sandwiched liquid crystal "cell" at the focal point of a laser beam, the laser forms a ring pattern. Researchers can visually observe the ring pattern on an observation screen or directly through a camera. By comparing the pattern of the beam, both with and without the cell, researchers can use computer algorithms to calculate beam profiles and information about the laser.

The *Photonics Spectra* magazine bestows the Photonics Circle of Excellence Award annually on the 25 most technically innovative new products of the year, as judged by members of the Editorial Advisory Board. For 14 years, these annual awards have recognized enterprising companies and individuals who push the limits of technology to develop new photonic products and processes.

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (02-ML-06)